

In the Claims:

19. A method of forming a device comprising:

providing a recess within a substrate;

providing at least a portion of an antenna within the recess;

providing an integrated circuit at least partially within the recess and in
operative electrical connection with the antenna;

wherein the antenna crosses itself at a bypass, said bypass comprising
dielectric material between crossing portions of the antenna; and

wherein the antenna includes a connection between the integrated circuit
and a first antenna portion, the first antenna portion extending from at least
partially within the recess to outside the recess, a second connection between
the integrated circuit and a second antenna portion, the second antenna portion
extending from at least partially within the recess to outside the recess, and a
third antenna portion outside of the recess and coupled to the first and second
antenna portions.

39. A method comprising:

forming a recess in a flexible plastic substrate, the recess having an approximately planar bottom surface and no more than four sidewall surfaces that slope approximately linearly outward from the bottom surface toward an upper surface of the substrate;

providing a monolithic integrated circuit chip within the recess, the chip comprising RFID circuitry coupled to first and second antenna ports to enable wireless communications and to provide memory and processing functions;

providing a first conductive film coupled to the first antenna port of the chip and extending over at least a portion of a first of the sidewall surfaces;and

providing a second conductive film coupled to the second antenna port of the chip and extending over at least a portion of a second of the sidewall surfaces.

40. The method of claim 39, wherein providing the first and second conductive films comprises printing.

41. The method of claim 39, further comprising forming a conductive adhesive between the first conductive film and the first antenna port and forming a conductive adhesive between the second conductive film and the second antenna port.

42. The method of claim 41, further comprising:
providing at least a portion of an antenna over the upper surface of the substrate and coupling the antenna to the first and second conductive films; and
laminating a flexible plastic film over the recess and the chip.

43. The method of claim 39, further comprising:
providing at least a portion of an antenna formed using a first process over the upper surface of the substrate;
coupling the antenna to the first and second conductive films, the first and second conductive films having been formed using a second process; and
laminating a flexible plastic film over the recess and the chip.

Please add new claims as follows:

44. A method comprising:

receiving an RF signal by an antenna disposed outside of a recess formed in a flexible plastic substrate, the recess having an approximately planar bottom surface and no more than four sidewall surfaces that slope approximately linearly outward from the bottom surface toward an upper surface of the substrate, the antenna and recess covered by a laminating film; and

processing the RF signal using a monolithic integrated circuit disposed within the recess, the integrated circuit comprising RFID circuitry to provide memory and processing functions and coupled to the antenna by a conductive film coupled to the integrated circuit at a first end and coupled to the antenna at a second end, the conductive film disposed over one of the four sidewall surfaces

45. The method of claim 44, wherein the conductive film comprises a printed material.

46. The method of claim 44, wherein the integrated circuit is coupled to the conductive film at the first end via a conductive adhesive.

47. The method of claim 46, wherein the first end of the conductive film is disposed over the bottom surface, the second end of the conductive film is disposed over the upper surface, and the conductive film comprises a printed material.

48. The method of claim 44, wherein the first end of the conductive film is disposed over the bottom surface and the second end of the conductive film is disposed over the upper surface.

49. The method of claim 44, wherein the antenna comprises a material that is different from the conductive film.

50. The method of claim 44, wherein the antenna comprises a printed material.

51. The method of claim 50, wherein the integrated circuit is further coupled to the antenna by a second conductive film disposed over another of the four sidewall surfaces and coupled to the integrated circuit via a conductive adhesive.

52. The method of claim 44, wherein the integrated circuit is further coupled to the antenna by a second conductive film disposed over another of the four sidewall surfaces and coupled to the integrated circuit via a conductive adhesive.

53. The method of claim 44, wherein readable information is visible from the laminated film.

54. The method of claim 44, wherein the laminated film is less than about one mil in thickness.

55. A method comprising:
processing a signal using an integrated circuit disposed within a recess formed in a flexible plastic substrate, the recess comprising four sidewall surfaces that slope approximately linearly outward from a bottom surface toward an upper surface of the substrate, the integrated circuit comprising RFID circuitry to provide memory and processing functions;

transmitting the signal wirelessly using an antenna disposed outside the recess and electrically coupled to the integrated circuit via a conductive film coupled to the integrated circuit in a first region and coupled to the antenna in a

second region, the signal being wirelessly transmitted through a laminating film over the flexible plastic substrate, the recess, the conductive film, the integrated circuit, and the antenna.

56. The method of claim 55, wherein the conductive film comprises a printed film.

57. The method of claim 55, wherein the first region of the conductive film is disposed above the bottom surface.

58. The method of claim 57, wherein the conductive film is disposed above at least one of the sidewall surfaces between the first and second regions.

59. The method of claim 58, wherein a conductive adhesive couples the integrated circuit to the first region of the first conductive film.

60. The method of claim 59, wherein the antenna comprises a material that is different from the conductive film.

61. The method of claim 60, wherein the antenna comprises a printed film.

62. The method of claim 55, wherein the laminating film is less than about one mil in thickness.

63. A method comprising:
providing a flexible plastic substrate comprising a plurality of recesses,
each of the recesses having a bottom surface and four sidewall surfaces that
extend non-perpendicularly from the bottom surface toward an upper surface of
the substrate, each of the four sidewall surfaces sloped approximately linearly
outward from the bottom surface toward the upper surface;

disposing a plurality of integrated circuits within the plurality of recesses
such that each of the recesses contains an integrated circuit, each of the
integrated circuits comprising RFID circuitry to provide memory and processing
functions; and

providing a plurality of continuous conductive films, each of the continuous conductive films having a first portion and a second portion, the first portion being coupled to respective ones of the integrated circuits disposed within the recesses and the second portion extending above the upper surface of the substrate.

64. The method of claim 63, wherein the substrate comprises a plurality of rows of recesses and a plurality of columns of recesses.

65. The method of claim 63, further comprising covering the plurality of integrated circuits and the plurality of continuous conductive films with an insulting material initially provided as a liquid material that is subsequently cured into a non-liquid material, and wherein each of the continuous conductive films is disposed over at least one respective sidewall surface between the first and second portions.

66. The method of claim 63, wherein the continuous conductive films comprise printed films.

67. The method of claim 63, wherein the first portion of each of the continuous conductive films is coupled to respective ones of the integrated circuits using a conductive adhesive.

68. A method comprising:
transmitting an RF signal using a radio frequency identification device including a recess disposed in a flexible plastic substrate, the recess having a bottom surface and four sidewall surfaces that extend non-perpendicularly from the bottom surface toward an upper surface of the substrate, each of the sidewall surfaces sloping outward from the bottom surface toward the upper surface;

receiving a signal using an antenna, a first portion of which comprising a first conductive film disposed above the upper surface and a second portion of which comprising a second conductive film coupled to the first conductive film in a first region of the second conductive film disposed above the upper surface, the first and second conductive films comprising different materials; and

processing the received signal using an integrated circuit disposed within the recess, the integrated circuit including RFID circuitry to provide memory and processing functions and coupled to a second region of the second conductive film disposed above the bottom surface, the second conductive film having a third region between the first and second regions and disposed above one of the sidewall surfaces.

69. The method of claim 68, wherein the integrated circuit is coupled to the second region of the second conductive film via a conductive adhesive bonded to the integrated circuit and to the second region of the second conductive film.

70. The method of claim 69 wherein at least one of the sidewall surfaces slopes at least generally linearly from the bottom surface.

71. The method of claim 68, wherein the RF signal is transmitted through a flexible laminated film disposed above the recess, the antenna, and the integrated circuit.

72. The method of claim 71 wherein the second conductive film is covered with an insulating material and the laminated film is disposed above the insulating material.

73. A method comprising:

forming a recess in a flexible plastic substrate, the recess having a bottom surface and four sidewall surfaces that extend non-perpendicularly from the bottom surface toward an upper surface of the substrate, each of the four sidewall surfaces sloped outward at least generally linearly from the bottom surface toward the upper surface;

providing an antenna portion disposed outside of the recess;

disposing an integrated circuit within the recess, the integrated circuit comprising RFID circuitry to provide memory and processing functions;

disposing a conductive material layer over at least one of the four sidewall surfaces to couple the integrated circuit to the antenna portion outside the recess; and

laminating a flexible film over the recess, the integrated circuit, and the conductive material layer.

74. The method of claim 73, wherein depositing the conductive material layer comprises printing a film.

75. The method of claim 73, further comprising coupling the integrated circuit to the conductive material layer using a conductive adhesive.

76. The method of claim 75, wherein the conductive material layer is disposed over the bottom surface at a first end and over the upper surface at a second end.

77. The method of claim 76, further comprising covering the conductive material layer with an insulating material and laminating the flexible film directly on at least a portion of the insulating material.

78. The method of claim 77, wherein the antenna comprises a material layer that is different from the conductive material layer.

79. The method of claim 73, further comprising covering the conductive material layer with an insulating material and laminating the flexible film over the insulating material.

80. The method of claim 79, wherein covering the conductive material layer with the insulating material comprises forming the insulating material directly on the conductive material layer and over the upper surface of the substrate.

81. The method of claim 80, wherein covering the conductive material layer with the insulating material includes depositing a liquid material and curing the liquid material to form the insulating material.

82. The method of claim 81, wherein depositing the conductive material layer comprises printing a film.

83. The method of claim 82, wherein the laminated film is less than about one mil in thickness.

84. A method comprising:

providing a recess in a flexible plastic substrate, the recess having a bottom surface and sidewall surfaces that extend non-perpendicularly from the bottom surface toward an upper surface of the substrate, each of the sidewall surfaces sloping outward from the bottom surface toward the upper surface;

providing an antenna, at least a portion of which is a first conductive film disposed above the upper surface;

disposing an integrated circuit within the recess, the integrated circuit comprising RFID circuitry to provide memory and processing functions;

providing a second conductive film, separate from the first conductive film, having a first region coupled to the integrated circuit and a second region coupled to the portion of the antenna; and

disposing a flexible protective film above the recess, the antenna, the integrated circuit, and the conductive film.

85. The method of claim 84, wherein the second conductive film comprises a printed film.

86. The method of claim 84, wherein the first region of the second conductive film is disposed above the bottom surface.

87. The method of claim 84, wherein the second conductive film is disposed above at least one of the sidewall surfaces between the first and second regions.

88. The method of claim 84, further comprising bonding a conductive adhesive to the integrated circuit and to the first region of the first conductive film.

89. The method of claim 84, wherein at least one of the sidewall surfaces slopes in at least a generally linear manner from the bottom surface.

90. The method of claim 89, further comprising covering the conductive film with an insulating material and disposing the flexible protective film over the insulating material.

91. The method of claim 84, further comprising covering the conductive film with an insulating material and disposing the flexible protective film over the insulating material.

92. A method comprising:

providing a flexible plastic substrate comprising a plurality of recesses, each of the recesses having a bottom surface and no more than four sidewall surfaces that extend non-perpendicularly from the bottom surface toward an upper surface of the substrate, each of the four sidewall surfaces sloped generally linearly outward from the bottom surface toward the upper surface;

disposing a plurality of integrated circuits within the plurality of recesses such that each of the recesses contains no more than a single integrated circuit, each of the integrated circuits comprising RFID circuitry to provide memory and processing functions; and

forming a plurality of continuous conductive films, each of the continuous conductive films having a first portion and a second portion, the first portion being coupled to respective ones of the integrated circuits disposed within the recesses and the second portion extending above the upper surface of the substrate.

93. The method of claim 92, wherein the substrate comprises a plurality of rows of recesses and a plurality of columns of recesses, and further comprising dividing the substrate into a plurality of singular substrates after forming the plurality of conductive films, each of the singular substrates comprising a single recess.

94. The method of claim 93, wherein each of the continuous conductive films is disposed above at least one respective sidewall surface between the first and second portions, and each of the singular substrates comprises two continuous conductive films.

95. The method of claim 94, wherein forming the plurality of continuous conductive films comprises printing a conductive material.

96. The method of claim 95, wherein the first portion of each of the continuous conductive films is coupled to respective ones of the integrated circuits using a conductive adhesive.

97. A method comprising:

disposing a recess in a flexible plastic substrate, the recess having a bottom surface and four sidewall surfaces that extend non-perpendicularly from the bottom surface toward an upper surface of the substrate, each of the sidewall surfaces sloping outward from the bottom surface toward the upper surface;

providing an antenna, at least a portion of which is a first conductive film disposed above the upper surface;

disposing an integrated circuit within the recess, the integrated circuit comprising RFID circuitry to provide memory and processing functions;

providing a second conductive film, separate from the first conductive film, having a first region coupled to the integrated circuit and disposed above the bottom surface, having a second region coupled to the portion of the antenna and disposed above the upper surface, and having a third region between the first and second regions and disposed above one of the sidewall surfaces; and

disposing a flexible laminated film over the recess, the integrated circuit, the antenna, and the conductive film.

98. The method of claim 97, further comprising bonding a conductive adhesive to the integrated circuit and to the first region of the second conductive film.

99. The method of claim 98, wherein providing the second conductive film comprises printing the second conductive film.

100. The method of claim 99, further comprising covering the second conductive film with an insulating material and disposing the flexible protective film over the insulating material.

101. The method of claim 100 wherein at least one of the sidewall surfaces slopes in at least a generally linear manner from the bottom surface.